

# High-Repetition-Rate Interferometric Rayleigh Scattering for Velocity, Density, and Temperature Meas, Phase I

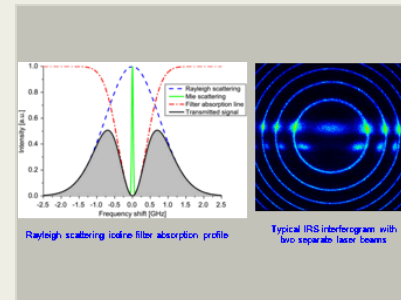
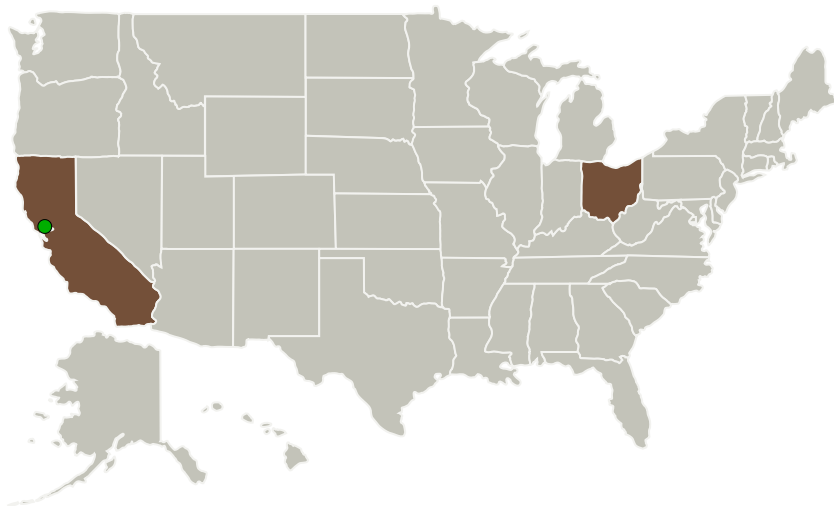
Completed Technology Project (2016 - 2016)



## Project Introduction

Subsonic, transonic, supersonic, and hypersonic ground test facilities are used extensively to evaluate forces and moments as well as surface measurements on test articles required to validate computational tools used to extrapolate wind tunnel data to realistic flight conditions and hardware. The development of fast and noninvasive instrumentation and measurement capabilities that can readily be integrated into the extreme environments is one of several major technological challenges associated with the design, building, and operation of these complex test environments. Accurately mapping velocity flow fields-undoubtedly one of the most critical parameters-remains a significant challenge. In addition, spatially and temporally resolved measurements of other flow parameters such as density, pressure, and temperature are of paramount importance. This proposal offers an integrated package of truly cutting-edge, multidimensional, seedless velocimetry and multi-flow-parameter diagnostics for wind tunnels and ground test facilities. The concepts and ideas proposed are ranging from proof-of-principles demonstration of novel methodologies using 10-100 kHz-rate nanosecond (10-100 nsec) duration burst-mode laser sources for measurements in realistic tunnel conditions. The proposed high-repetition-rate Rayleigh scattering which is suitable for any wind tunnel testing involving various gases is a state-of-the-art technique for analysis of unsteady and turbulent flows.

## Primary U.S. Work Locations and Key Partners



High-repetition-rate Interferometric Rayleigh Scattering for Velocity, Density, and Temperature Measurements for Ground Test Facilities, Phase I

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Organizations Performing Work	Role	Type	Location
Spectral Energies, LLC	Lead Organization	Industry Small Disadvantaged Business (SDB)	Dayton, Ohio
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

## Primary U.S. Work Locations

California	Ohio
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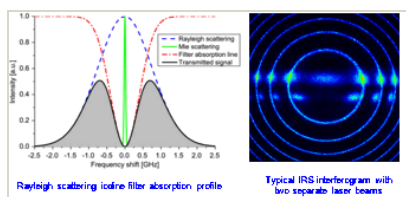
## Project Transitions

**June 2016:** Project Start**December 2016:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139884>)

## Images



### Briefing Chart Image

High-repetition-rate Interferometric Rayleigh Scattering for Velocity, Density, and Temperature Measurements for Ground Test Facilities, Phase I  
(<https://techport.nasa.gov/image/135922>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Spectral Energies, LLC

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

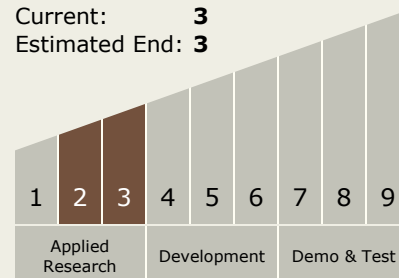
Carlos Torrez

### Principal Investigator:

Naibo Jiang

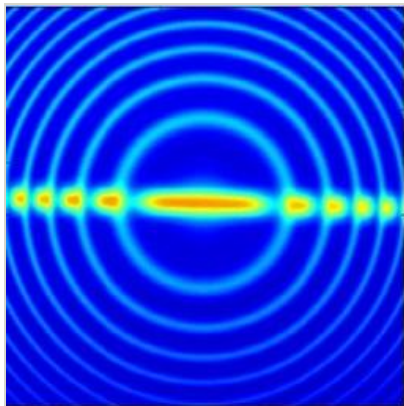
## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Final Summary Chart Image

High-repetition-rate Interferometric Rayleigh Scattering for Velocity, Density, and Temperature Measurements for Ground Test Facilities, Phase I Project Image (<https://techport.nasa.gov/image/132062>)

## Technology Areas

### Primary:

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.8 Ground and Flight Test Technologies

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System